

A COMPREHENSIVE WORK ON DIPHTHERIA.

The Bacteriology of Diphtheria. Edited by Dr. G. H. F. Nuttall, F.R.S., and Dr. G. S. Graham-Smith. Pp. xx+718. (Cambridge: University Press, 1908.) Price 25s. net.

THIS important work aims at a much more comprehensive account of the essential facts underlying the pathology of diphtheria than its title suggests. It is by far the most complete record of our present knowledge of this disease hitherto written in the English language. Not only is the bacteriology of diphtheria dealt with very fully, but chapters are included which cover the history of the disease, its epidemiology, its mortality, and an account of its toxins and antitoxins. Seeing that we have come to regard the antitoxin treatment as the only rational method of therapeutics in this disease, the reader has here before him practically all he may need to know about diphtheria, except certain clinical facts which he can easily find in any text-book of medicine. The inclusion of a short chapter embodying these facts, indeed, would have completed the whole subject from beginning to end.

Of all the infective diseases which trouble mankind, diphtheria stands foremost as the one concerning which our knowledge seems most complete. It may be mere vanity to say so, but this knowledge appears to contain few, if any, gaps of vital consequence to the human race. The nature of the causal micro-organism is known, the methods of detecting this in afflicted persons are matters of everyday practice, and, most important of all, the specific remedy is in universal use. It is quite doubtful if all this can be said of any other infective disease. Were there room for boasting in the sphere of medical science, this array of brilliant discoveries connected with diphtheria might be quoted with pride as conquests for humanity, won by much toil in the face of great difficulties. These discoveries, of the utmost practical value in the treatment of the disease, constitute one of the greatest arguments against the statement oft-times made, that the results of animal experimentation prove this method of research to be devoid of useful results. Not only the discovery of the cause of the disease, but the very manufacture of the only remedy known to cure it, has depended almost solely upon animal experiments.

The book opens with a short series of biographical sketches of the men whose names figure most prominently in connection with these discoveries: Bretonneau, who first recognised the clinical picture presented by the disease; Loeffler, who discovered the specific microbe; Behring, who first enunciated the principles of toxin and antitoxin; and Roux, to whose studies we owe the preparation of anti-diphtherial serum. Excellent photographs accompany these sketches.

The subject-matter proper of the book is contributed by well-chosen authors. To Prof. Loeffler is given the task of writing the history of the disease, resulting in fifty pages of most fascinating reading. Dr. News-holme treats of the epidemiology and Prof. Mallory

of the pathology of diphtheria. The causal bacillus and its various congeners, with the modes of infection and methods of diagnosis, are dealt with by Dr. Graham-Smith. Matters of immunity, including the difficult subject of toxin and antitoxin, are discussed by Dr. Dean, and a most carefully written chapter on mortality comes from the pens of Drs. Park and Bolduan. The last-named writers also contribute a section upon serum sickness. A very full bibliography, including all the papers extant upon the subject, and a useful index, complete the work. Sixteen plates are inserted, and the photomicrographs in these are excellently reproduced.

Despite a most thorough acquaintance with the work, we have failed to find anything at which to carp. There is nothing to say except praise for the editors, who have produced a magnificent exposition of modern knowledge on this important disease—an exposition which must certainly take its place as the classical authority upon the subject. T. J. H.

ALLOYS.

Alloys and their Industrial Applications. By E. F. Law. Pp. xvi+269; with numerous illustrations and plates. (London: C. Griffin and Co., Ltd., 1909.) Price 12s. 6d. net.

IT is not easy to realise the unimportance or even insignificance of metals, as such, in the workaday world. Generally speaking, it is only when they are mixed together that they are converted from chemical curiosities into useful materials. The improvements in the properties of metals usually brought about by alloying them are a reduction in melting point so that they can be more easily melted and cast, and an increase in hardness, which confers greater strength and durability. The only general deterioration caused by alloying is a reduction in malleability and ductility, which can be put up with if it is not allowed to get out of hand. It is typical of the extent to which the essential and fundamental may be lost sight of amid the wealth of detail in modern study that the comparative lowness of the melting points of alloys is never once alluded to in the volume under review.

It must not be concluded, however, that Mr. Law's book is lacking in clearness of thought or in balance. It is the most important summary of the state of knowledge on the subject that has appeared for many years. More than this, it is a well-considered attempt to make the results of the recent scientific investigations on alloys available to manufacturers and engineers. How far the attempt will be successful cannot yet be said. It is not the author's fault that English manufacturers are wary birds, and that it is difficult to put the salt of research on their tails. It is not even his fault that much recent research has been somewhat beside the mark.

Besides, efforts have not been spared to apply investigations to the problems that most need solution. As soon as trustworthy pyrometers made their appearance, there was a rush to determine the melting points of alloys and then to ascertain the nature and extent of

their pasty stages. The hardness of alloys was found to be due in many cases to the formation of inter-metallic compounds, and straightway the conditions of formation of numbers of these were investigated. The toughness and ductility of alloys were seen to be connected with their structure, and the effects of annealing, quenching, and the like on the structure were accordingly subjected to careful scrutiny. It is natural for scientific observers to lose sight of the practical bearing of their work, and to wander, in the author's words, "in the intricacies of solid solutions, hyper-eutectics, solidus curves and phases," whether the manufacturer refuses to follow them. It has been Mr. Law's business to show that there is another side to research, and that something has been done besides the manufacture of a set of new labels.

On the whole the result of his labours is promising. The book is written in an easy conversational manner, which encourages the reader to continue seeing what the author has to say. About 100 pages are devoted to the general properties of alloys and the methods of investigating them, and the remainder to special descriptions of particular alloys. Only those employed in the industries are dealt with, and though at first sight this seems to leave many gaps, we are reconciled to the method as we realise how much space is saved for useful and practical remarks.

Both sections have been carefully prepared, and mistakes are far from numerous. Among those noticed is the statement on p. 219, and again on p. 221, that 5 per cent. of cadmium is added to standard silver in America as a deoxidant. This should, of course, be 5 per 1000. Then the definition of "isomorphous" in the glossary, "a term applied to crystals exhibiting similarity in form," leaves much to be desired. The "glossary of terms" generally is weak, alike in respect of omissions and of inexactness. The author is happier when dealing with photomicrography. Both the colour photographs reproduced in the frontispiece and the series of plates at the end of the book are really handsome illustrations of the structure of metals, and are far in advance of the smudgy photographs or diagrammatic drawings usually associated with such work.

T. K. R.

ASTRONOMICAL DETERMINATION OF POSITION FROM BALLOON.

Astronomische Ortsbestimmung im Ballon. By Prof. Adolf Marcuse. Pp. 67. (Berlin: Georg Reimer, 1909.)

THE great advances made in aerial transit, by which long-distance voyages are rendered possible by ordinary spherical balloons, while hundreds of miles may be travelled by dirigibles, and the prospect of long-distance voyages in the rapidly improving aeroplanes, suggest at once the important problem of the determination of the astronomical position of these craft at any moment.

During the daytime, while the earth is in view and not rendered invisible by cloud strata below, the experienced aeronaut can easily locate his position by means

of the many excellent large-scale charts at his disposal. On clear nights, by means of the light of the moon, he is also able to follow his course, and, failing the moon, he can pick up his whereabouts by closely observing the lighted-up cities and towns as he approaches them.

With, however, no glimpse of the earth below him, the only two facts which he has in his possession are his height from the ground and the magnetic cardinal points.

In a spherical balloon this knowledge does not inform him whether he is travelling in a northerly, southerly, easterly, or westerly direction. In a dirigible he may head his craft in the direction of any of the points of the compass, but then his leeway will be an unknown, probably a very considerable, quantity, and he will soon find that his position in relation to the earth's surface is unknown.

For navigating purposes it is as important to know exactly where one is when travelling in the air as it is to a sailor when his ship is ploughing the ocean.

The volume before us is therefore very welcome, for Prof. Marcuse brings together, in a very concise and simple manner, methods which can and have been employed on actual voyages. It must be understood, in the first instance, that very rigid determination of position cannot at present be attempted. In the first place, the basket of a balloon is seldom steady, and is nearly always in a slow state of rotation. Again, the envelope above the observer cuts off a considerable portion of the sky that would be available under land or sea conditions, but against this he is in an elevated position and his horizon is clearer. Possibly better observations can be made from the platforms of dirigibles than from the baskets of spherical balloons.

The instruments necessary for the determination of the latitude and longitude, to which reference is made in this book, are the level-quadrant for the observation of altitude, a chronometer for recording Greenwich time, and a fluid compass with an alignment addition for azimuth observations. The first portion of the book, parts i. to iii., deals with the instruments, their use, and the general nature of the problems to be solved. Part iv. is devoted to the formulæ, forms for working them out quickly, and numerous worked-out examples; this portion is divided into two parts, treating of day and night observations. In part v. the use of the tables given at the end is explained in detail, and a description is also given of the charts which conclude the book. These maps include a chart of the northern hemisphere, showing the brighter stars which are best available for use, and following this are two magnetic maps, showing by isogonic lines the deviation of the compass from the true meridians for the year 1909 for (a) the whole of Germany and (b) for Europe.

This brief summary of the main features of this book shows that it is well adapted for the purpose it has in view. British aeronauts should therefore make themselves acquainted with some of the methods here expounded, for the subject will increase in importance as years go by.

W. J. S. LOCKYER.